

AMENDMENTS TO THE CLAIMS

Please amend the claims as set forth below in marked-up form.

1. (Currently amended) A liquid discharging method for discharging droplets from a plurality of liquid discharging portions, the method comprising the steps of:
discharging droplets from the liquid discharging portions to form an actual pattern;
obtaining information about a defective liquid discharging portion having discharging failure by checking the actual pattern for the discharging states of the droplets from the liquid discharging portions; and
prohibiting the defective liquid discharging portion from discharging, and controlling discharging of droplets from a liquid discharging portion near the defective liquid discharging portion by changing the number of discharging shots from a liquid discharging portion disposed on one side of the defective liquid discharging portion.
2. (Original) A liquid discharging method according to claim 1, wherein the discharging failure means that no droplets are discharged from the defective liquid discharging portion.
3. (Original) A liquid discharging method according to claim 1, wherein the discharging failure means that the discharging direction from the defective liquid discharging portion deviates from an allowable range.
4. (Original) A liquid discharging method according to claim 1, wherein the discharging failure means that the amount of liquid in the droplets discharged from the defective liquid discharging portion is outside an allowable range.

5. (Canceled)

6. (Currently amended) A liquid discharging method according to any one of claims 2 to 4, wherein the discharging of the droplets from the liquid discharging portion near the defective liquid discharging portion is controlled by changing the ~~discharging amount of liquid from liquid discharging portions disposed on both sides of the defective liquid discharging portion, or the number of discharging shots therefrom~~ number of discharging shots from liquid discharging portions disposed on both sides of the defective liquid discharging portion.

7. (Original) A liquid discharging method according to any one of claims 2 to 4, wherein the discharging of the droplets from the liquid discharging portion near the defective liquid discharging portion is controlled by alternately changing the discharging amount of liquid from liquid discharging portions disposed on both sides of the defective liquid discharging portion, or the number of discharging shots therefrom every time one line is formed.

8. (Original) A liquid discharging method according to any one of claims 2 to 4, wherein the discharging of the droplets from the liquid discharging portion near the defective liquid discharging portion is controlled by discharging the droplets according to new droplet discharging signals that are generated on the basis of original liquid discharging signals for the defective liquid discharging portion and liquid discharging portions on both sides thereof in order to reduce the influence of the discharging failure of the defective liquid discharging portion.

9. (Original) A liquid discharging method according to claim 8, wherein the new liquid discharging signals depend on the characteristics of the droplets, the type of a recording medium, or an image formation mode.

10. (Previously presented) A liquid discharging method according to claim 8, wherein the new liquid discharging signals are listed in a table beforehand.

11. (Currently amended) A liquid discharging apparatus for forming an image on a recording medium by discharging droplets from a plurality of liquid discharging portions onto the recording medium, the apparatus comprising:

a liquid discharging head having the liquid discharging portions;

a head driver for controlling the driving of the liquid discharging head;

an image processing unit that converts externally input image data into head driving data for driving the liquid discharging head and sends the head driving data to the head driver; and

a storage section for storing information about a defective liquid discharging portion having discharging failure, the information being obtained by checking an actual pattern that indicates the discharging states of the droplets of the liquid discharging patterns,

wherein image formation on the recording medium is corrected by prohibiting the defective liquid discharging portion ~~from~~ from discharging, and controlling discharging from a liquid discharging portion near the defective liquid discharging portion by changing the number of discharging shots from a liquid discharging portion disposed on one side of the defective liquid discharging portion, according to the information about the defective liquid discharging portion stored in the storage section.

12. (Original) A liquid discharging apparatus according to claim 11, wherein the storage section is provided inside the liquid discharging head, inside the image processing unit, or inside an external control unit.

13. (Original) A liquid discharging method according to claim 11, wherein the discharging failure means that no droplets are discharged from the defective liquid discharging portion.

14. (Original) A liquid discharging method according to claim 11, wherein the discharging failure means that the discharging direction from the defective liquid discharging direction deviates from an allowable range.

15. (Original) A liquid discharging method according to claim 11, wherein the discharging failure means that the amount of liquid in the droplets discharged from the defective liquid discharging portion is outside an allowable range.

16. (Canceled)

17. (Currently amended) A liquid discharging method according to any one of claims 13 to 15, wherein the discharging of the droplets from the liquid discharging portion near the defective liquid discharging portion is controlled by changing the ~~discharging amount of liquid from liquid discharging portions disposed on both sides of the defective liquid discharging portion, or the number of discharging shots therefrom~~ number of discharging shots from liquid discharging portions disposed on both sides of the defective liquid discharging portion.

18. (Original) A liquid discharging method according to any one of claims 13 to 15, wherein the discharging of the droplets from the liquid discharging portion near the defective liquid discharging portion is controlled by alternately changing the discharging amount of liquid from liquid discharging portions disposed on both sides of the defective liquid discharging portion, or the number of discharging shots therefrom every time one line is formed.

19. (Original) A liquid discharging method according to any one of claims 13 to 15, wherein the discharging of the droplets from the liquid discharging portion near the defective liquid discharging portion is controlled by discharging the droplets according to new droplet discharging signals that are generated on the basis of original liquid discharging signals for the defective liquid discharging portion and liquid discharging portions on both sides thereof in order to reduce the influence of the discharging failure of the defective liquid discharging portion.

20. (Original) A liquid discharging method according to claim 19, wherein the new liquid discharging signals depend on the characteristics of the droplets, the type of a recording medium, or an image formation mode.

21. (Previously presented) A liquid discharging method according to claim 19, wherein the new liquid discharging signals are listed in a table beforehand.

22. (Currently amended) A liquid discharging method for discharging droplets from a plurality of liquid discharging portions onto a recording medium while controlling the discharging directions of the droplets, the liquid discharging portions comprising a liquid chamber containing liquid to be discharged and a plurality of heating elements arranged in a predetermined direction inside the liquid chamber to generate a bubble in the liquid in the liquid chamber by the application of energy so that the liquid is discharged from a liquid discharging outlet, and the method comprising the steps of:

obtaining information about a defective liquid discharging portion by checking the discharging states of the droplets discharged from the liquid discharging portions; and

prohibiting the defective liquid discharging portion from discharging and discharging droplets from a liquid discharging portion different from the defective liquid discharging portion

while controlling the discharging direction by applying a difference in energy between at least one of the heating elements and at least another one of the heating elements so as to control the discharging direction of the liquid discharged from the liquid discharging outlet.

23. (Currently amended) A liquid discharging method for forming dot arrays or dots on a recording medium by discharging droplets from a plurality of liquid discharging portions while controlling the discharging direction and changing the dot diameter by the number of the discharged droplets, the liquid discharging portions comprising a liquid chamber containing liquid to be discharged and a plurality of heating elements arranged in a predetermined direction inside the liquid chamber to generate a bubble in the liquid in the liquid chamber by the application of energy so that the liquid is discharged from a liquid discharging outlet, and the method comprising the steps of:

obtaining information about a defective liquid discharging portion by checking the discharging states of the droplets discharged from the liquid discharging portions; and

prohibiting the defective liquid discharging portion from discharging and discharging a plurality of droplets from a liquid discharging portion different from the defective liquid discharging portion while controlling the discharging direction by applying a difference in energy between at least one of the heating elements and at least another one of the heating elements so as to control the discharging direction of the liquid discharged from the liquid discharging outlet.

24. (Currently amended) A liquid discharging method for forming dot arrays or dots on a recording medium by discharging droplets from a plurality of liquid discharging portions while controlling the discharging direction and changing the dot diameter by the number of the discharged droplets, the liquid discharging portions comprising a liquid chamber containing liquid to be discharged and a plurality of heating elements arranged in a predetermined direction inside the liquid chamber to generate a bubble in the liquid in the liquid chamber by the

application of energy so that the liquid is discharged from a liquid discharging outlet, and the
method comprising the steps of:

obtaining information about a defective liquid discharging portion having discharging failure by checking the discharging states of the droplets discharged from the liquid discharging portions;

prohibiting the defective liquid discharging portion from discharging and generating new droplet discharging signals for reducing the influence of the discharging failure of the defective liquid discharging portion; and

discharging droplets from a liquid discharging portion different from the defective liquid discharging portion while controlling the discharging direction by applying a difference in energy between at least one of the heating elements and at least another one of the heating elements so as to control the discharging direction of the liquid discharged from the liquid discharging outlet, according to the new droplet discharging signals.

25. (Currently amended) A liquid discharging method according to claim 24, wherein the new droplet discharging signals are generated only when the diameter of the dots formed on the recording medium by the droplets discharged from the liquid discharging portion different from the defective liquid discharging portion takes ~~the~~ a minimum value or is close to the minimum value.

26. (Original) A liquid discharging method according to claim 24 or 25, wherein the new liquid discharging signals are generated on the basis of a previously created table.

27. (Original) A liquid discharging method according to any one of claims 22 to 24, wherein the discharging failure means that no droplets are discharged from the defective liquid discharging portion.

28. (Original) A liquid discharging method according to any one of claims 22 to 24, wherein the discharging failure means that the discharging direction from the defective liquid discharging direction deviates from an allowable range.

29. (Original) A liquid discharging method according to any one of claims 22 to 24, wherein the discharging failure means that the amount of liquid in the droplets discharged from the defective liquid discharging portion is outside an allowable range.

30. (Currently amended) A liquid discharging apparatus for forming dot arrays or dots on a recording medium by discharging droplets from a plurality of liquid discharging portions onto the recording medium while controlling the discharging direction, the apparatus comprising:

a liquid discharging head having the liquid discharging portions[[:]], wherein each of the liquid discharging portions comprises a liquid chamber containing liquid to be discharged and a plurality of heating elements arranged in a predetermined direction inside the liquid chamber to generate a bubble in the liquid in the liquid chamber by the application of energy so that the liquid is discharged from a liquid discharging outlet;

a head driver for controlling the driving of the liquid discharging head;

a processing unit for that converts externally input signals into droplet discharging signals for driving the liquid discharging head and sends the droplet discharging signals to the head driver; and

a storage section for storing information about a defective liquid discharging portion having discharging failure, the information being obtained by checking the discharging states of the droplets from the liquid discharging portions,

wherein the influence of discharging failure of the defective droplet discharging portion is reduced by prohibiting the defective liquid discharging portion from discharging and discharging

droplets from a liquid discharging portion different from the defective liquid discharging portion while controlling the discharging direction by applying a difference in energy between at least one of the heating elements and at least another one of the heating elements so as to control the discharging direction of the liquid discharged from the liquid discharging outlet, according to the information about the defective liquid discharging portion stored in the storage section.

31. (Currently amended) A liquid discharging apparatus for forming dot arrays or dots on a recording medium by discharging droplets from a plurality of liquid discharging portions onto the recording medium while controlling the discharging direction and changing the dot diameter by the number of the discharged droplets, the apparatus comprising:

a liquid discharging head having the liquid discharging portions[[:]], wherein each of the liquid discharging portions comprises a liquid chamber containing liquid to be discharged and a plurality of heating elements arranged in a predetermined direction inside the liquid chamber to generate a bubble in the liquid in the liquid chamber by the application of energy so that the liquid is discharged from a liquid discharging outlet;

a head driver for controlling the driving of the liquid discharging head;

a processing unit that converts externally input signals into droplet discharging signals for driving the liquid discharging head and sends the droplet discharging signals to the head driver;
and

a storage section for storing information about a defective liquid discharging portion, the information being obtained by checking the discharging states of the droplets discharged from the liquid discharging portions,

wherein the influence of discharging failure of the defective droplet discharging portion is reduced by prohibiting the defective liquid discharging portion from discharging and discharging droplets from a liquid discharging portion different from the defective liquid discharging portion while controlling the discharging direction by applying a difference in energy between at least

one of the heating elements and at least another one of the heating elements so as to control the discharging direction of the liquid discharged from the liquid discharging outlet and so as to change the dot diameter, according to the information about the defective liquid discharging portion stored in the storage section.

32. (Currently amended) A liquid discharging apparatus for forming dot arrays or dots on a recording medium by discharging droplets from a plurality of liquid discharging portions onto the recording medium while controlling the discharging direction and changing the dot diameter by the number of the discharged droplets, the apparatus comprising:

a liquid discharging head having the liquid discharging portions[[:]], wherein each of the liquid discharging portions comprises a liquid chamber containing liquid to be discharged and a plurality of heating elements arranged in a predetermined direction inside the liquid chamber to generate a bubble in the liquid in the liquid chamber by the application of energy so that the liquid is discharged from a liquid discharging outlet;

a head driver for controlling the driving of the liquid discharging head;

a processing unit that converts externally input signals into droplet discharging signals for driving the liquid discharging head and sends the droplet discharging signals to the head driver;

a storage section for storing information about a defective liquid discharging portion, the information being obtained by checking the discharging states of the droplets discharged from the liquid discharging portions; and

a discharging corrector for generating new droplet discharging signals to reduce the influence of discharging failure of the defective discharging portion,

wherein the influence of discharging failure of the defective droplet discharging portion is reduced by prohibiting the defective liquid discharging portion from discharging according to the information about the defective liquid discharging portion, and discharging droplets from a liquid discharging portion different from the defective liquid discharging portion while controlling the

discharging direction by applying a difference in energy between at least one of the heating elements and at least another one of the heating elements so as to control the discharging direction of the liquid discharged from the liquid discharging outlet, according to the new droplet discharging signals generated by the discharging corrector so as to change the dot diameter.

33. (Currently amended) A liquid discharging apparatus according to claim 32, wherein the new droplet discharging signals are generated only when the diameter of the dots formed on the recording medium by the droplets discharged from the liquid discharging portion different from the defective liquid discharging portion takes ~~the~~ a minimum value or is close to the minimum value.

34. (Original) A liquid discharging method according to claim 32 or 33, wherein the new liquid discharging signals are generated on the basis of a previously created table.

35. (Original) A liquid discharging apparatus according to any one of claims 30 to 32, wherein the storage section is provided inside the liquid discharging head, inside the processing unit, or inside an external control unit.

36. (Original) A liquid discharging method according to any one of claims 30 to 32, wherein the discharging failure means that no droplets are discharged from the defective liquid discharging portion.

37. (Original) A liquid discharging method according to any one of claims 30 to 32, wherein the discharging failure means that the discharging direction from the defective liquid discharging direction deviates from allowable range.

38. (Original) A liquid discharging method according to any one of claims 30 to 32, wherein the discharging failure means that the amount of liquid in the droplets discharged from the defective liquid discharging portion is outside an allowable range.

39. (Canceled)

40. (Original) A liquid discharging apparatus according to any one of claims 30 to 32, wherein each of the liquid discharging portions comprises:

a liquid chamber containing liquid to be discharged; and

a plurality of energy-generating elements arranged in a predetermined direction inside the liquid chamber to generate energy for causing the liquid in the liquid chamber to be discharged from a liquid discharging opening,

wherein a difference in energy to be generated is formed between at least one of the energy-generating elements and at least another one of the energy-generating elements so as to control the discharging direction of the liquid discharged from the liquid discharging opening.

41. (Previously presented) A liquid discharging method according to claim 9, wherein the new liquid discharging signals are listed in a table beforehand.

42. (Previously presented) A liquid discharging method according to claim 20, wherein the new liquid discharging signals are listed in a table beforehand.